US006539025B1

(12) **United States Patent**
Manning et al.

(10) **Patent No.: US 6,539,025 B1**
(45) **Date of Patent: Mar. 25, 2003**

(54) **PRIORITY ARBITRATION FOR POINT-TO-POINT AND MULTIPOINT TRANSMISSION**

(75) Inventors: **Thomas A. Manning**, Northboro, MA (US); **Stephen A. Caldara**, Sudbury, MA (US); **Stephen A. Hauser**, Burlington, MA (US); **Matthias L. Colsman**, Cologne (DE)

(73) Assignees: **Fujitsu Network Communications, Inc.**, Richardson, TX (US); **Fujitsu Limited**, Kawasaki (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/268,500**

(22) Filed: **Mar. 11, 1999**

Related U.S. Application Data

(63) Continuation of application No. 08/683,153, filed on Jul. 18, 1996, now Pat. No. 5,956,342.
(60) Provisional application No. 60/001,498, filed on Jul. 19, 1995.

(51) **Int. Cl.**[7] **H04L 12/28**
(52) **U.S. Cl.** **370/414**; 370/235
(58) **Field of Search** 370/395.2, 395.31, 370/395.4, 414, 429, 432, 905, 353, 352, 389, 413, 428, 415, 416, 417, 418, 419, 468, 250, 252, 254, 351, 391, 392, 395.1, 399, 230, 235, 229, 442, 347, 461, 462; 340/825.5; 709/235

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,051,982	A *	9/1991	Brown	370/381
5,392,280	A *	2/1995	Zheng	370/353
5,838,681	A *	11/1998	Bonomi et al.	370/353
5,956,342	A *	9/1999	Manning et al.	370/414

* cited by examiner

Primary Examiner—Dang Ton
(74) *Attorney, Agent, or Firm*—Weingarten, Schurgin, Gagnebin & Lebovici LLP

(57) **ABSTRACT**

An Asynchronous Transfer Mode switch and method which facilitate priority arbitration of point-to-point and point-to-multipoint transmission are disclosed. To execute point-to-multipoint operation a bandwidth arbiter maintains a first list of connections and bit vectors indicating designated destination ports. The list maintained by the bandwidth arbiter is then compared to an unassigned output port bit vector to determine matches therebetween at which point-to-multipoint transmission may be made by utilizing instantaneously unused bandwidth within the switch. To execute point-to-point operation each input port maintains a list of connections associated with each output port, and those lists are used in conjunction with output port request information per input port in the bandwidth arbiter to match requests to the unassigned output port bit vector. The bandwidth arbiter may also assign priority to connections in the list.

29 Claims, 10 Drawing Sheets